

REMARKS

The application has been amended and is believed to be in condition for allowance.

The independent claims have been amended.

There are no formal matters outstanding.

Applicant appreciates the analysis provided in the Response to Arguments part of the Official Action.

Claims 1, 3-7, 10, 11, 13, 14, 16, 18, 19, 21, 23 and 24 are rejected as anticipated by ROBERTSON 3,389,274.

Claims 20 and 22 are rejected as obvious over ROBERTSON.

Claims 12, 25 and 26 are rejected as obvious over ROBERTSON in view of BAUDENDISTEL 6,664,711.

The presently amended claims 1, 16 and 25 now further recite a means/step of providing a normal force between the body and the peristaltic actuating element.

The term "normal" is the technical term denoting a force perpendicular to the surface and has nothing to do with the word "normal" in the meaning of "typical", "as usual" etc. The normal force is, e.g., denoted as 86 in Figures 7 and 11.

In ROBERTSON, a peristaltic actuator is disclosed, having a central rod, around which actuating ring-shaped members are provided. The actuating members are in some embodiments of magnetostrictive material and in some embodiments of piezoelectric material. Pulses are provided to excite selected

parts of the actuating members, causing a peristaltic motion relative to the rod.

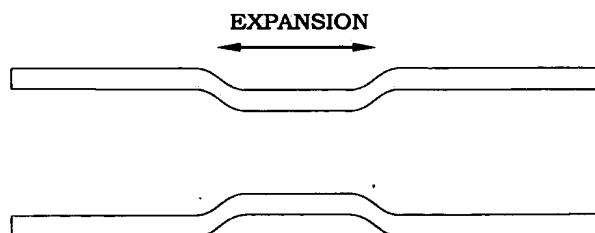
In the presently amended claim 1 of the present invention, the actuating material is stated to be piezoelectric. It is preferably of miniature size.

Furthermore, the invention is characterised by causing the interaction surface with the peristaltic section to be removed from the body simultaneously as the dimension change.

Finally, there are means provided for providing a normal force between the peristaltic actuator and the body.

When considering the piezoelectric embodiments of ROBERTSON, the first feature is disclosed. However, the ROBERTSON invention makes use of a piezoelectric material that expands in the length direction when pulses are applied to the piezoelectric plates and encircles the rod to interact with.

With such a material and geometry, the peristaltic wave will be a compressive pressure wave, i.e., where the length change is accompanied by a reduction in the diameter, essentially according to basic elastic properties. This is illustrated in the below Figure.



Thus, one concludes that both the inner diameter and the outer diameter are shrinking, which leads to a clamping of the central rod. There are no piezoelectric materials that exhibit the property of simultaneously increasing both length and diameter.

The piezoelectric arrangement of ROBERTSON will thus exhibit a larger force on the rod at the sections that are expanded, than outside these sections. The rod will therefore be "clamped" in these sections and the motion is therefore obstructed.

There might be theoretical possibilities to make an arrangement where pulses are applied to shrink the piezoelectric plates in the length direction and hence get an increase in the diameter. This has been tested in various non-peristaltic ring shaped products with little success since the increase is very small in relation to the negative tolerances needed to get a tight fitting, as also stated in ROBERTSON.

The materials existing today are the same as was used 1968 and to get control of the normal force, the diameters have to be in the order of meters, which by no means could be considered as suitable for miniature sizes.

ROBERTSON does not disclose nor indicate the use of any length contraction in the piezoelectric case.

Furthermore, the technical solution of ROBERTSON relies on that the body, by the symmetry of the peristaltic actuator,

will be maintained in contact with the peristaltic actuator. This is extremely difficult to obtain in practice with reasonable tolerances, and that is one main reason why the geometries disclosed in ROBERTSON are NOT preferred.

Presently amended claim 1 specifies that there is provided a normal force, i.e., a contacting force perpendicular to the contact surfaces, between the peristaltic actuator and the body. The action of the peristaltic actuator is thereby used to counteract the applied normal force. By this provision, the balance between the normal force and the removing of the peristaltic section is less sensitive to manufacturing tolerances.

ROBERTSON provides no teaching or suggestion in this regard and therefore neither anticipates nor renders obvious this feature.

The other independent claims are similarly amended.

In the view of the above, the amended independent claims are both novel and non-obvious. Reconsideration and allowance of all the pending claims are respectfully requested.

The dependent claims are believed allowable at least for depending from an allowable claim.

Should there be any further matter outstanding that requires resolution, it is requested that the undersigned attorney be contacted.

Applicant believes that the present application is in condition for allowance and an early indication of the same is respectfully requested.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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